

*The main sandstone or typical Nugget.* The main sandstone which constitutes the greater part of the formation is typical Nugget sandstone. In many places it consists of brick-red, platy, fine-textured sandstone in beds 1 to 6 inches thick, which form rounded hills that are strewn with angular, platy blocks weathered from the ledges. In other places the sandstone is somewhat firmer, coarser textured, and pinkish to whitish in color. Markings resembling footprints and other impressions were collected from these sandstones, but they proved to be too indistinct for identification. The lighter colored sandstones are somewhat quartzitic and weather into angular blocks that form a dark purplish talus. The top of the sandstone is not exposed, or has not been recognized, for the stratigraphically overlying Twin Creek limestone has been faulted irregularly across the formation. The thickness of the main sandstone has not been measured but it is estimated at not less than 1500 feet.

The thickness of the entire formation appears to be as much as 2400 feet in the Fort Hall Indian Reservation and it may be somewhat greater.

BOTANY.—*The systematic position of the "rain tree,"* *Pithecolobium Saman*. E. D. MERRILL, Bureau of Science, Manila, P. I. (Communicated by WILLIAM R. MAXON.)

The genus *Pithecolobium* as interpreted by Bentham is rather a heterogeneous assemblage of plants. Some of the species placed under this name differ so radically from typical representatives of *Pithecolobium* that in some instances sectional differences within the genus are decidedly greater than the distinctions between some of the universally recognized genera of the Mimosoideae, while within the section *Samanea* the same statement holds for specific differences. It is believed that *Pithecolobium* will be a much more natural group if certain species be removed from it. At the present time, however, I am concerned especially with but a single one, the well known "rain tree," *Pithecolobium Saman* Benth., a native of tropical America but now extensively planted in most tropical countries.

Among other species placed in the section *Samanea* of *Pithe-*

*colobium* by Bentham I am confident that the Malayan *Pithecolobium moniliferum* Benth. should be removed as the type of a distinct genus, *Cathormion*, as Hasskarl<sup>1</sup> has already proposed. In transferring this species from *Inga* to *Pithecolobium* Bentham inadvertently transcribed the specific name *moniliformis* as *moniliferum*, in which he was followed by Hasskarl. The correct specific name and synonymy are as follows:

## CATHORMION Hassk.

CATHORMION MONILIFORME (Hassk.) Merrill.

*Inga moniliformis* DC. Prodr. 2: 440. 1825.*Pithecolobium moniliferum* Benth. in Hook. Lond. Journ. Bot. 3: 211. 1844.*Inga monilifera* DC. ex Benth. loc. cit. in syn.*Cathormion moniliferum* Hassk. Nat. Tijdschr. Ned. Ind. 10: 231. 1856.

The type of this species was from the Island of Timor, and the plant is cultivated in the Botanical Garden at Buitenzorg, Java.

Aside from the question of the generic limits of *Pithecolobium*, however, the application and validity of the name itself warrant some consideration. Mr. S. C. Stuntz, of the United States Department of Agriculture, has called my attention to the fact that *Pithecolobium* was originally published by Martius<sup>2</sup> as *Pithecellobium*, the name being correctly derived from *πιθηκος* (monkey) and *ελλόβιον* (earring), so that there was no need to change the spelling to *Pithecollobium*, as Martius<sup>3</sup> did in 1837, nor to *Pithecolobium*, as Bentham<sup>4</sup> did in 1844, the latter making the derivation of the latter part of the name from the Greek *λοβός*, the lobe or lower part of the ear.

The original publication is as follows:

PITHECELLOBIUM Mart. (*Inga* Auct). Affenohrring XXIII. 1.

cyclocarpum Mart. (Ing. W.)

Caracas. b C.

inundatum Mart. Bras. b C.

Unguis Cati Mart. Bras. b C.

<sup>1</sup> Nat. Tijdschr. Ned. Ind. 10: 231. 1856.<sup>2</sup> Hort. Reg. Monac. 188. 1829.<sup>3</sup> Flora, 20<sup>2</sup>: Beibl. 114. 1837.<sup>4</sup> Hook. Lond. Journ. Bot. 3: 195. 1844.

Mr. Stuntz would regard the first species as the type of the genus, as it is the only one of the three enumerated that can be connected with a previously published binomial, *Inga cyclocarpa* Willd. This selection of the type would be most unfortunate as *Inga cyclocarpa* Willd. (= *Pithecolobium cyclocarpum* Mart.) is an *Enterolobium*, so that the species now placed in *Enterolobium* would have to be transferred to *Pithecolobium*, while the more numerous ones now placed in *Pithecolobium* would need a new generic name. *Zygia* as published by Boehmer<sup>5</sup> would thus become the generic name for our *Pithecolobium* species, a name much older than the latter, although *Pithecolobium* is retained in the supplementary list of *nomina conservanda* adopted by the Brussels Botanical Congress.<sup>6</sup>

By absolutely strict rules of priority *Inga cyclocarpa* Willd. is undoubtedly the type of the genus *Pithecolobium*, and Martius undoubtedly derived his generic name *Pithecellobium* from the fruit characters of this species; yet it seems possible to save the name in its currently accepted sense by the selection, somewhat arbitrarily if necessary, of another species as the type. In the original publication the species are alphabetically arranged. There are no descriptions. The first species has a definite reference to *Inga cyclocarpa* Willd.; the second is a *nomen nudum*, apparently never further considered; while the third is manifestly a transfer of *Mimosa unguis cati* L. (= *Inga unguis cati* Willd.), although no synonym is hinted at other than in the general statement, following the generic name: "Inga Auct." The selection of this species as the type of the genus *Pithecolobium*, or *Pithecellobium* as originally published, will save the name in its currently accepted sense.

Again it is worth while to examine the original description of the genus as given by Martius.<sup>7</sup> It includes "Pithecolobium" and "Enterolobium" characters, but the *Pithecolobium* fruit character "legumen . . . . tortum" appears before the *Enterolobium* character "aut pluries cochleatum." The first species described is a true *Pithecolobium*, *P. tortum* Mart., the description of which

<sup>5</sup> Ludwig, *Defin. Gen. Pl.* 72. 1760.

<sup>6</sup> *Act. Congr. Int. Bot. Brux.* 1: 114. 1910.

<sup>7</sup> *Flora*, 20<sup>2</sup>: Beibl. 114. 1837.

precedes the generic diagnosis. Following the generic diagnosis are cited *Inga excelsa* Kunth, *I. unguis cati* Willd., *I. bigemina* Willd., *I. cyclocarpa* Willd., *I. cochleata* Willd., and *I. contorta* Willd., and the original descriptions of *P. auaremotemo* Mart., *P. cauliflorum* Mart., and *P. gummiferum* Mart. Of the ten species mentioned or described six are now placed in *Pithecolobium*, three in *Enterolobium*, and one in *Inga*.

I have merely stated the case for and against two possible interpretations of the type of the genus *Pithecolobium*. Convenience will certainly be served much better by the selection of *P. unguis cati* as the type. With this introductory statement regarding the genus *Pithecolobium* itself it is now proposed to consider a single species, long placed in the genus, but which the author considers to be generically distinct.

In the year 1800 the species under consideration was originally described by Jacquin from South American material as *Mimosa Saman*. It was transferred to *Inga* by Willdenow a few years later and subsequently by other authors successively to *Pithecolobium*, *Calliandra*, *Albizzia*, and *Enterolobium*. Thus in less than one hundred years it has been considered by different writers under six generic names. As the various genera are now interpreted, *Pithecolobium Saman*, to use its generally accepted name, differs radically from all. *Mimosa*, *Inga*, *Calliandra*, and *Albizzia* can be dismissed without discussion, as the rain tree cannot possibly be referred to any of these genera. As between the two remaining genera, *Pithecolobium* and *Enterolobium*, it cannot possibly belong to the former as it has somewhat fleshy, at least pulpy, straight, indehiscent, and septate pods. Its true alliance is unquestionably with *Enterolobium*, where Sir David Prain has placed it; and yet in its straight or nearly straight, fleshy or pulpy pods and pedicelled flowers it is decidedly anomalous in *Enterolobium*, while in facies it is very strikingly different from the representatives of this genus known to me. Prain's<sup>8</sup> discussion is so lucid and to the point that it is here reproduced:

When Mr. Bentham tentatively placed the species [*Enterolobium saman* Prain] in *Pithecolobium* he explained that the tree was unknown

<sup>8</sup> Journ. As. Soc. Beng. 64<sup>2</sup>: 252. 1898.



to him. Dr. Grisebach, who had the advantage of studying the tree in the living state, at once recognized that it cannot possibly be a *Pithecolobium* and placed it in *Calliandra*, no doubt owing to the sutures of the pod being thickened as in that genus. That the pods are septate and indehiscent militates however against his proposal, for the crucial test of a *Calliandra* is that its pods, which may *not* be septate, shall dehisce elastically from apex to base. The Index Kewensis has therefore replaced the "Rain-Tree" in *Pithecolobium*; this however is a step which in turn similarly mars the generic limits of that group, since the pods of *Pithecolobium* must not be septate. The writer places the species with more confidence in *Enterolobium*, owing to its possessing the septate pods characteristic of that genus. The pulpy, in place of spongy at length indurated mesocarp, and the shortly pedicelled in place of sessile florets, cannot, in view of the variability of these characters within adjacent genera, be considered more than comparatively trivial deviations from the hitherto recognized characters of *Enterolobium*. The writer is unable, both on academic and on practical grounds, to agree with the proposal, made by some botanists, to amalgamate *Calliandra*, *Pithecolobium*, *Enterolobium* and *Albizzia*.

I am in entire agreement with Prain, except that after having had an opportunity to study several species of *Enterolobium* I am thoroughly convinced that, although the alliance of *Pithecolobium Saman* Benth. is unquestionably with *Enterolobium* and not with *Pithecolobium*, it represents a group generically distinct, and that if placed in *Enterolobium* it will be anomalous in that genus, although not to the same extent as in *Pithecolobium*. I propose therefore to raise to generic rank Bentham's section *Samanea*, which is typified by the species under consideration. I am confident, however, that many of the species ultimately placed by Bentham in this section are not congeneric with *Samanea* as typified by *Pithecolobium Saman*, and I am equally confident that some of them cannot be logically considered as representatives of the genus *Pithecolobium*. Several species are, however, unquestionably congeneric with *Samanea* and should be transferred here.

*Samanea* (Benth.) Merrill, gen. nov.

*Pithecolobium* Mart. § *Samanea* Benth. in Hook. Lond. Journ. Bot. 3: 197. 1844.—Trans. Linn. Soc. 30: 585. 1875.

Flores 5-meri, hermaphroditi. Calyx infundibuliformis, breviter lobatus. Corolla subinfundibuliformis, petalis usque ad medium connatis, valvatis. Stamina  $\infty$ , basi in tubo connata, longe exserta; antherae parvae, eglandulosae. Ovarium sessile,  $\infty$ -ovulatum, stylis

filiformibus, stigmatibus minuto, capitato. Legumen rectum vel leviter curvatum, indehiscens, crassocompressum, epicarpio tenue crustaceo, mesocarpio pulposo, endocarpio firmiter crustaceo, continuo, inter semina septa formante, suturis incrassatis. Semina numerosa, transversa, oblongo-ovata, leviter compressa, nitida, exarillata, utrinque cum areola anguste oblonga instructa, funiculo filiformi.

Arbor procera, coma expansa, inermis. Folia abrupte bipinnata. 4-6-juga, glandulis interjugalibus instructa, foliolis deorsum minoribus, pinnis superioribus 6-8-jugatis, inferioribus 3-5-jugatis. Stipulae lanceolatae, parvae, deciduae. Pedunculi solitarii vel subfasciculati, elongati, in axillis superioribus subterminales. Flores rosei, pedicellati, inter *Mimoseas* mediocres, in capitulis globosis dispositi.

The genus as above defined is most closely allied to *Enterolobium*, differing especially in its straight or nearly straight, pulpy, not indurated pods, and its pedicelled not sessile flowers. *Pithecolobium* differs in its cochleate, curved or twisted, nonseptate, dehiscent pods, the seeds often arillate. *Albizzia* differs especially in its thin, dehiscent, nonseptate pods.

**Samanea Saman** (Jacq.) Merrill.

*Mimosa Saman* Jacq. Fragmenta 15. pl. 9. 1800.

*Inga Saman* Willd. Sp. Pl. 4: 1024. 1806.

*Pithecolobium Saman* Benth. in Hook. Lond. Journ. Bot. 3: 101. 1844.

*Calliandra Saman* Griseb. Fl. Brit. W. Ind. 225. 1864.

*Albizzia Saman* F. Muell. Select Extra-Trop. Plants 27. 1891.

*Enterolobium Saman* Prain, ex King in Journ. As. Soc. Beng. 66<sup>2</sup>: 352. 1897.

Other synonyms given by Bentham are *Inga cinerea* Humb. & Bonpl., *Inga salutaris* H.B.K., *Mimosa pubifera* Poir., *Calliandra tubulosa* Benth., and *Pithecolobium cinereum* Benth.

*Samanea Saman*, though apparently a native of the northern part of South America, is now widely distributed in cultivation in most tropical countries. It is remarkable for its exceedingly fast growth, the ease with which it can be transplanted, and the rapidity with which it recovers from the most severe pruning when transplanted. The tree reaches large proportions, and on account of its widely spreading branches forms a magnificent shade tree. The sweet pulpy pods are produced in great abundance and are relished by cattle. In fact in some countries the cultivation of the tree has been recommended on account of the forage value of its pods. Because of the ease with which it can be propagated and its very rapid growth it gives promise of being of great value in reforestation work in some tropical coun-

tries. While of comparatively recent introduction into the tropics of the Old World, it is now of very wide distribution and in some countries has already established itself. It was introduced into the Philippines in about the year 1860 and is now by far the most common shade tree to be found in the larger towns throughout the Archipelago. The wood, which is dark in color, appears to be of some value, especially for interior finishings.

In tropical America *Samanea Saman* is known as *guango*, *samán*, *centzaro*, and *arbol de la lluvia*, in the Philippines as *acacia*, in various British tropical colonies as rain tree, and in Hawaii as monkey pod. The common English name, rain tree, and its Spanish equivalent, *arbol de la lluvia*, probably owe their origin to the fact that the "sleep" or closing of the leaflets is a very conspicuous phenomenon, occurring at the approach of and during rains, and at night. The author has never observed, in this species, any dripping of water from hydathodes, such as has been noted in some tropical trees. In tropical countries with which the author is familiar flowering occurs at the height of the dry season. In those countries having a decided dry season the tree is deciduous, but the new leaves appear within a few days after the fall of the old ones, followed at once by anthesis which continues for several months.